

OKLAHOMA GEOLOGICAL SURVEY

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Circular No. 29

MINERAL PRODUCTION OF OKLAHOMA 1885-1949

COMPILED

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1951

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INTRODUCTION

This report is prepared to bring up to date the mass of statistical data on volume and value of mineral production in Oklahoma from the earliest date for which records are available. Primary purpose of this compilation is to make available in one report a record of the mineral production of Oklahoma and at the same time show something of the magnitude and importance of minerals in the economy of the State.

The scope of the information presented covers the full period of time from the earliest available statistical figures reported on either production or value of any mineral resources of Oklahoma to the latest date for which such figures were available at the time of publication. For some items, the latest authentic information on production is for the year 1948, but for most major groups the figures were available for the year 1949, and are included.

Production and value figures given in the following tables were obtained by checking all available sources in the Geological library of the University of Oklahoma and the Oklahoma Geological Survey. Chief sources of information were from statistical publications of the U. S. Geological Survey and the U. S. Bureau of Mines, published annually. These publications were as follows: *Mineral Resources of the United States* published by the U. S. Geological Survey, 1882 to 1924—(From 1894 to 1899 included as a part of the 16th to 21st Annual Reports of the U. S. Geological Survey), and by the U. S. Bureau of Mines, 1924-1931; and *Minerals Yearbook* by the U. S. Bureau of Mines, beginning with 1932-33 and continuing to the present.

Other sources include some of the earlier publications of the Oklahoma Geological Survey, particularly Bulletins 15 and 22 which contain statistical summaries and includes some estimates on various items that are not given separately in the government publications.

Data pertaining to agriculture, manufacturing, and total income were assembled by Francis R. Cella, director of the Bureau of Business Research, University of Oklahoma, and members of his staff.

Estimates on oil production for the years 1905 and 1906 for Oklahoma are those given in *Petroleum in the United States and Possessions* by Ralph Arnold and William J. Kemnitzer, 1931.

An attempt was made to assemble all available data on Oklahoma mineral production. In a few instances where figures were not available in the government publications cited above, unofficial estimates were used for the earlier years, when such estimates were available. Total value of mineral production by states is not available in the *Mineral Resources* prior to 1905, and the totals given here were obtained by adding the totals of each mineral for which figures could be found. The State totals for 1905 and 1906 given in *Mineral Resources* were adjusted on the basis of estimates of petroleum production for Oklahoma, made by Arnold and Kemnitzer, as the government figures combined Oklahoma and Kansas petroleum production for those years.

Some indication of the importance of minerals to modern man can be gathered from the frantic scramble for adequate supplies of certain "strategic" minerals for military purposes and the resultant long lists of everyday items that become scarce or impossible to obtain during any large scale military program. Few people take time to consider the ultimate source of common consumer goods, including cooking and other household items, ordinarily taken for granted by the housewife.

Basically, one of the primary differences between a primitive civilization with its crude agricultural economy and a modern civilization with an industrial economy, is the knowledge and the utilization of mineral resources. Historically, there appears to be rather a close parallel between the growth of civilization with constantly increasing standards of living and the increase in knowledge of the minerals of the earth, and their utilization for the comfort and conveniences of man. In a general sort of way, it may be true to say that the extent to which minerals are utilized is a measure of the degree of civilization.

Minerals, though worthless in the ground, have, therefore, been the foundation of our modern economy and civilization. Those people who have not made industrial use of minerals tend to main-

tain a subsistence type of agricultural economy, or at best, exchange agricultural or other raw materials for comparatively small amounts of manufactured goods from the industrial nations. In the United States where the mass of the people have the highest standards of living in the world, minerals and the mineral fuels are utilized to a greater extent than in any other large region of the earth. The chief basic sources of new wealth are manufacturing; organic raw materials—products of agriculture, forest, and fisheries; and mineral production.

In the creation of new wealth, in the United States as a whole, minerals rank lowest in dollar value, and the value added by manufacturing is first. Hence, the importance of minerals comes from their utilization in the manufacturing industry of the Nation. Without minerals, notably iron, copper, and aluminum, only the crudest kind of manufacturing equipment could be made; and without mineral fuels—coal, oil, and gas, few manufacturing plants could operate. Thus, we may say, the key to our economic position is our industrial use of minerals.

In Oklahoma, minerals have held a key place in the economy of the State for many years. On a percentage basis, as compared with the rest of the Nation, Oklahoma is dominantly a mineral-producing State. From the period 1920 to 1942, mineral production was the most important source of new wealth in Oklahoma. Agriculture was second. For some years, the value of mineral production exceeded the value of both agriculture and the value added by manufacturing. This relationship is in reverse order of the national relationship of the value of manufacturing, agriculture, and mineral production. Since 1942, with prices of farm products rising proportionately much higher than for mineral products, the dollar value of agriculture production has exceeded that of mineral production. However, even since 1942, the value of mineral production compared to agriculture has been far higher in Oklahoma than the national average.

The importance of other industries to agriculture and a concrete evidence that agriculture should be the first to promote and

encourage the growth of manufacturing and mineral industries is shown by the fact that those States having the highest rate of manufacturing also have the highest income for agriculture. A statistical study of the relationship between industrial activity and agricultural income shows those States and regions with the highest average income to agriculture, per square mile, were the States that had the highest value added by manufacturing. The high rate of income from mineral production in Oklahoma has improved the position of agriculture but not to the same extent as would a highly-developed manufacturing industry.

Pending further industrial development in Oklahoma, it is difficult to over-emphasize the importance of the mineral industry to Oklahoma. These industries are contributing a large share to the general revenues of the State Government as well as to the total income of the people and the creation of new wealth in the State. The mineral industries are providing employment for a part of the population not required in operating the farms and service industries of the State, thus holding some of our young people in Oklahoma who otherwise would be forced to seek employment in the industrialized areas of the nation.

A further and important potential value is that many of these mineral raw materials could provide a basis for important industrial expansion. Further utilization of minerals in new industries would give added employment opportunities to the youth of Oklahoma, increase the taxable wealth of the State, and expand the near-at-home markets for farm products, thus increasing the average agricultural income per square mile for the State.

The following tabulations are an attempt to give as complete a record of production and value of Oklahoma minerals as can be compiled from available records. There are some items which have been in production continuously for many years for which figures are not given. This is because of the restriction against revealing records of individual producers. Under the agreements by the U. S. Bureau of Mines, total production figures are held confidential if there are less than three producers in the State. In

such instances, the figures are combined under miscellaneous. For some minerals there have been three or more producers for some years and less than three for others which explains the intermittent listing of figures on production and value. In some products, such as coke, the industry itself was of relatively short duration.

Because of the importance of mineral production to the economy of Oklahoma, many people have been interested in the growth of the industry as a whole and others have become interested in the growing importance of a particular commodity. For this reason, it was deemed advisable to compile the available information and present it in table form so that the growth of the industry as a whole or of any particular mineral resource can be obtained from one condensed report.

PRODUCTION AND VALUE TABLES

MINERAL PRODUCTION OF OKLAHOMA VALUE BY YEARS—1885-1949

Year	Value	Remarks
1885	\$ 762,902	Coal and coke*
1886	877,557	Coal and coke
1887	1,320,127	Coal and coke
1888	1,453,827	Coal and coke
1889	1,341,764	Coal and coke
1890	1,600,765	Coal and coke
1891	1,929,344	Coal, coke, oil, lead, manganese
1892	2,056,861	Coal, coke, oil, lead
1893	2,291,959	Coal, coke, oil, lead, zinc
1894	1,591,113	Coal, coke, oil, lead, zinc, gypsum
1895	1,801,036	Coke, coke, gypsum
1896	2,038,689	Coal, coke, gypsum, clay products
1897	1,976,485	Coal, coke, gypsum, clay products
1898	2,053,168	Same as 1897 and limestone
1899	2,570,527	Same as 1898
1900	3,271,987	Same as 1899 and salt, granite.
1901	4,553,005	Same as 1900 and oil.
1902	5,110,784	Same as 1901 and Nat. gas, and sandstone
1903	7,626,465	Same as 1902 and grahamite, rock asphalt
1904	8,082,093	Same as 1903 and coal tar, lime
1905	10,682,679	MR 1904, and A&K oil estimated*
1906	15,458,488	MR 1906, and A&K oil estimated*

MINERAL PRODUCTION BY YEARS (Continued)

Year	Value	Year	Value
1907	26,908,968	1929	516,685,232
1908	26,586,751	1930	390,170,991
1909	29,008,138	1931	181,904,857
1910	32,988,865	1932	185,120,909
1911	42,678,446	1933	172,560,924
1912	53,614,130	1934	237,208,583
1913	80,168,820	1935	251,700,898
1914	78,744,447	1936	305,191,649
1915	81,311,962	1937	367,444,222
1916	169,556,331	1938	272,860,078
1917	259,134,377	1939	236,194,064
1918	336,857,921	1940	235,535,062
1919	291,078,174	1941	263,763,923
1920	493,320,359	1942	271,298,469
1921	269,882,786	1943	254,642,000
1922	369,069,612	1944	260,832,000
1923	398,810,630	1945	296,564,000
1924	393,030,665	1946	326,148,000
1925	501,767,118	1947	†355,750,000
1926	569,518,693	1948	†506,846,000
1927	524,594,732	1949	†483,696,000
1928	486,634,347		
		TOTAL	\$11,967,835,758

Average 1885-1949: \$184,120,550.

ALABASTER

Alabaster is a fine-textured variety of gypsum and occurs associated with the gypsum beds of western Oklahoma. Because of the ease with which alabaster can be carved, it was one of the earlier materials used for making art objects. In recent years Oklahoma alabaster has been quarried for the manufacture of art objects, but no separate production figures are available.

* Prior to 1905, totals obtained by adding items listed. No state summaries available in "Mineral Resources." In 1905 and 1906, totals given in "Mineral Resources" do not include petroleum for Oklahoma. Estimates made by Arnold and Kemnitzer are here added to Bureau of Mines totals for Oklahoma.

† Includes value of natural gas estimated at wells instead of value at point of consumption as in former years.

ASPHALTIC MATERIALS, NATURAL

Rock Asphalt		Grahamite (includes some impsonite for some years)	
Tons	Value	Tons	Value
4,230	\$ 12,708	877	\$15,442
5,457	12,516	1,000	25,000
1,300	3,250	1,635	24,540
738	2,029	1,952	16,432
4,002	11,627	966	7,743
None reported		2,286	20,340
6,423	12,846	3,894	32,737
11,959	65,244	None reported	
19,747	80,056	5,000	15,000
15,766	85,643		
16,459	91,416		
9,669	73,535	None reported, 1912 to 1921, inclusive	
16,907	118,351		
15,431	112,555		
5,793	34,344		
Included in other states.			
4,323	18,187		
7,522	45,898		
25,573	87,587		
47,556	163,502	41	533
25,800	150,100		
17,961	80,825		
27,450	82,830		
37,010	121,830		
327,076	\$1,466,879	17,651	\$157,767

Production figures for 1927-49 included with miscellaneous.

Maltha, a term formerly applied to the softer, native, asphaltic pitch, was reported as follows:

1907	25 tons	\$ 500
1908	116 tons	3,480
1909	102 tons	2,547

BARITE

Barite deposits are known in the Arbuckle Mountains and in an area south of the Wichita Mountains. In central Oklahoma crystals of barite and sand are common. Attempts to develop profitable mining operations have not been successful, as no large bodies of high grade barite have been uncovered.

BUILDING STONE

Sandstone, limestone and granite are used extensively in Oklahoma for the construction of buildings, chiefly as veneer or unfinished stone. Statistics are not available on quantities of stone used in this type of construction, but in recent years stone from certain areas have become established in the construction industry. Thin-bedded limestones of attractive colors have been quarried from the Arbuckle and Wichita Mountain areas, and from the northern and northeastern parts of the State. Some of the softer sandstones have been shaped and used for building blocks, and with the greater use of thin-bedded, attractive stone for veneer stone considerable quantities of sandstone have been used for that purpose. Worked deposits of sandstone are chiefly in the eastern half of the state.

CADMIUM

Recovery of cadmium from zinc ore was begun in Oklahoma in January, 1938. Production is now on the order of 25,000 pounds a month. Cadmium is one of the important minor metals and is used largely in protective coatings for other metals, in bearings and other alloys, and in pigments and chemicals.

CALCITE

Calcite has been mined in northern Comanche and northwestern Murray Counties. Reports indicate it has been marketed in pulverized form for soil treatment and also as poultry grits. A few thousand tons have been produced.

CALICHE

In the Southwest there are deposits consisting of soil materials cemented by limy material which are generally referred to as caliche. In some deposits the limy material makes up the bulk of these deposits. Caliche ranges from rather hard, compact rock to soft and porous types. Deposits occur in western Oklahoma, particularly in the northwest, where it has been used for road surfacing and perhaps for other purposes. No production figures are available.

CARBON BLACK

Carbon black was produced in Oklahoma as early as 1919 according to the first United States Geological Survey Mineral Report listing carbon black production. The production figures for Oklahoma were included with those of other states until 1942.

Year	Pounds	Value
1942	24,318,000	\$ 809,000
1943	31,411,000	1,036,000
1944	53,887,000	1,787,000
1945	53,192,000	1,987,000
1946	59,944,000	2,436,000

Value of carbon black not included in total value of mineral production for State. No production figures are available later than 1946.

CARBON DIOXIDE

Carbon dioxide is recovered from flue gases at the plant of the Ideal Portland Cement Company, Ada. It is liquefied for use in carbonated beverages and also converted to solid carbon dioxide or "dry ice", which is used chiefly as a refrigerant.

CELESTITE

Celestite or strontium sulfate is the principal source of strontium compounds used in making crimson-colored pyrotechnics. Small deposits, some of high grade, are found in Permian dolomite beds 1 to 10 feet thick near Weatherford, in west-central Oklahoma. A small amount of strontianite or strontium carbonate is associated with the celestite and dolomite. No production has been reported to date.

CEMENT

The 1906 issue of Mineral Resources reports that two cement plants were being built in that year in Indian Territory. Production has been continuous since 1908, but figures are available only for the years presented here; other years being included with miscellaneous.

CEMENT—Continued

Year	Barrels*	Value
1908		\$ 424,971 ^e
1909	781,660	710,270
1910	975,000	1,021,117
1911	928,722	619,225
1912	1,214,399	1,051,670
1913		1,258,676 ^e
1916	1,712,116	2,188,325
1917	1,736,761	2,633,479
1918	1,218,841	2,203,041
1919	1,366,884	2,657,339
1920	1,484,698	3,284,412
1921	1,596,566	3,420,093
Totals	13,015,647	\$21,472,618

* 1 bbl. weighs 376 lbs.

(^e) From O.G.S. Bull. 15, p. 42, estimated.

CHATS

Year	Tons	Value	Year	Tons	Value
1924	161,000	\$ 23,900	1938	1,504,900	216,370
1925	269,000	49,900	1939	1,663,100	
1926	410,000	81,000	1940	2,152,877	308,726
1927	388,000	69,000	1941	2,748,168	383,797
1928	264,000	40,000	1942	3,583,130	509,775
1929	240,400	46,800	1943	3,728,850	631,786
1930	330,000	82,500	1944	3,394,520	601,139
1931	146,000	21,900	1945	2,813,270	420,350
1932	110,000	16,500	1946	1,882,590	530,632
1933	91,050	18,210	1947	1,033,789	330,772
1934	131,000	20,560	1948	1,533,150	832,053
1935	1,099,600	143,590			
1936	1,134,500	181,000	TOTALS	34,804,594	\$5,970,935
1937	3,991,700	410,675	Av. Production		1,392,183
			Av. Value		\$238,837

CLAY

Clay and shale that is suitable for the manufacture of common red brick, face brick, and hollow tile can be found in many localities of the state. Buff-burning brick clay has not been found to have the wide distribution in the state as does the red burning clays, and at this time there is probably not more than one brick plant making buff brick from Oklahoma raw material.

There are several clay shales in Oklahoma which are suitable for pottery manufacture and some plants are using Oklahoma clays. There are several light firing clays within the state, but they have never been widely used.

Oklahoma has clays which have been used to a limited extent for the purpose of petroleum bleaching, chiefly "metabentonite," which occurs in northwestern Oklahoma.

Although detailed studies have not been made, the known occurrences indicate there are rather extensive reserves of kaolin in the Wichita Mountains.

Production figures represent raw clay sold or used by producers. Raw clay is included with miscellaneous for years not given in table below. Value of clay used in cement and heavy clay products is included here, but not in total value for State, as this value is incorporated in the value of finished products.

Year	Tons	Value	Year	Tons	Value
1932	6,097	\$ 69,875	1943 ¹	270,640	164,610
1933	5,630	65,141	1944	174,253	100,010
1934	8,502	84,241	1945	243,358	178,658
1935	6,735	70,327	1946	488,973	358,922
1936	4,361	53,548	1947	522,704	349,000
1937-1942—included with miscellaneous.			1948	510,316	389,903
			1949	480,199	374,179

Beginning with 1947, separate figures are reported for clay sold or used for cement, and for clays used for other than cement.

Year	Except Cement		Sold or Used for Cement	
	Tons	Value	Tons	Value
1947	223,929	\$199,613	298,775	\$149,387
1948	254,087	227,402	256,229	162,501
1949	244,104	222,256	236,095	151,923

¹ Prior to 1943, only clay sold was included. Beginning with 1943 the Bureau of Mines started including clays mined and used by cement and heavy clay products, such as brick and tile plants. Hence, figures prior to 1943 are not comparable with figures for later years.

CLAY PRODUCTS

Figures include heavy clay products other than pottery and refractories.

Year	Value	Year	Value
1896	\$ 23,000	1924	1,963,484
1897	44,352	1925	1,813,425
1898	113,891	1926	1,504,744
1899	185,627	1927	1,693,669
1900	194,457	1928	1,726,369
1901	322,284	1929	1,892,919
1902	403,649	1930	941,365
1903	534,977	1931	
1904	531,024	1932	79,835
1905	596,299	1933	128,396
1906	540,901	1934	196,046
1907	664,512	1935	266,185
1908	562,929	1936	633,805
1909	1,032,314	1937	583,334
1910	920,921	1938	572,289
1911	756,639	1939	720,587
1912	535,318	1940	532,000
1913	573,371	1941	838,000
1914	786,314	1942	630,000
1915	996,451	1943	700,000
1916	1,410,657	1944	600,000
1917	1,857,546	1945	707,272
1918	1,496,490	1946	1,556,000
1919	2,190,129	1947	1,563,000
1920	2,769,013	1948	1,899,000
1921	1,796,666	1949	1,999,000
1922	1,935,570		
1923	1,870,436		
		TOTAL	\$52,387,461
		Average—	\$988,443

COAL

Year	Tons	Value	Year	Tons	Value
1880	120,947		1890	869,229	1,579,188
1881	150,000		1891	1,091,032	1,897,037
1882	200,000		1892	1,192,721	2,043,479
1883	196,000		1893	1,252,110	2,235,200
1884	448,000		1894	969,606	1,541,293
1885	500,000	\$ 750,000	1895	1,211,185	1,737,254
1886	534,580	855,328	1896	1,366,646	1,918,115
1887	685,911	1,286,692	1897	1,336,380	1,787,358
1888	761,986	1,432,072	1898	1,381,466	1,827,638
1889	752,832	1,323,807	1899	1,537,427	2,199,785

COAL Continued

Year	Tons	Value	Year	Tons	Value
1900	1,922,298	2,788,224	1927	3,818,054	11,570,000
1901	2,421,781	3,915,268	1928	3,501,325	10,365,000
1902	2,820,666	4,265,106	1929	3,774,080	11,481,000
1903	3,517,388	6,386,463	1930	2,793,954	7,768,000
1904	3,046,539	5,532,066	1931	1,908,394	4,614,000
1905	2,924,427	5,145,358	1932	1,255,466	2,646,000
1906	2,860,200	5,482,366	1933	1,238,244	2,616,000
1907	3,642,658	7,433,914	1934	1,208,289	2,846,000
1908	2,948,116	5,976,504	1935	1,229,398	2,879,000
1909	3,119,377	6,253,367	1936	1,540,303	3,500,000
1910	2,646,226	5,867,947	1937	1,600,295	3,841,000
1911	3,074,242	6,291,494	1938	1,244,000	2,947,000
1912	3,675,418	7,867,331	1939	1,187,562	2,503,450
1913	4,165,770	8,542,748	1940	1,645,981	4,021,760
1914	3,988,613	8,204,015	1941	1,771,108	4,700,104
1915	3,693,580	7,435,906	1942	2,387,192	6,777,351
1916	3,608,011	7,525,427	1943	2,837,347	8,954,354
1917	4,386,844	12,335,413	1944	3,208,534	11,135,485
1918	4,813,447	17,508,884	1945	2,908,976	10,487,344
1919	3,802,113	14,544,901	1946	2,647,380	9,926,836
1920	4,849,228	23,294,000	1947	3,420,563	15,101,477
1921	3,362,623	15,546,000	1948	3,462,184	16,618,676
1922	2,802,511	11,527,000	1949	3,021,859	15,242,403
1923	2,885,038	10,874,000			
1924	2,329,615	8,590,000	TOTALS	158,643,788	\$432,799,188
1925	2,325,840	7,667,000	Av. Production—		
1926	2,842,673	9,042,000	1880-1949—2,266,340 tons		
			Av. Value—1885-1949—\$6,658,449		

COAL TAR

Year	Gallons	Value
1904	13,570	\$ 768
1905	54,002	3,323
1907	193,531	14,275
Totals	261,103	\$18,366
Averages	87,034	\$ 6,122

COKE

Year	Tons	Value	Year	Tons	Value
1880	1,546	\$ 4,638	1885	3,584	12,902
1881	1,768	5,304	1886	6,351	22,229
1882	2,025	6,075	1887	10,060	33,435
1883	2,573	7,719	1888	7,502	21,755
1884	1,912	5,736	1889	6,639	17,957

COKE Continued

Year	Tons	Value	Year	Tons	Value
1890	6,639	21,577	1901	37,374	154,834
1891	9,464	30,483	1902	49,441	202,921
1892	3,569	12,402	1903	49,818	227,542
1893	7,135	25,072	1904	44,808	209,165
1894	3,051	10,693	1905	54,781	199,424
1895	5,175	17,657	1906	49,782	204,205
1896	21,021	73,574	1907	19,089	82,447
1897	30,364	104,725	1908	2,944	13,437 ^e
1898	34,110	96,639			
1899	34,339	71,965	TOTALS	545,005	\$2,048,716
1900	38,141	152,204	Average	18,793	\$70,645
			(e) Estimated		

COPPER

A little ore was reportedly shipped from near Byars in 1897-98; and 25 tons of ore in 1920 and 30 tons about 1931-34 were shipped to El Paso from southwestern Okfuskee County. None of these shipments proved profitable.

CRUSHED STONE

Year	Tons	Value	Year	Tons	Value
1901		\$ 450	1926	1,418,320	1,240,148
1902		320	1927	1,639,770	1,303,034
1903			1928	1,902,240	1,521,898
1904		66,114	1929	2,017,310	1,497,416
1905	269,762	139,732	1930	1,921,800	1,487,464
1906	285,800	149,225	1931	1,512,960	1,156,239
1907	274,072	167,152	1932	746,990	518,349
1908	414,594	241,675	1933	708,730	477,453
1909	711,930	445,393	1934	909,280	576,024
1910	665,023	341,807	1935	682,640	436,166
1911	948,030	547,037	1936	1,084,230	905,112
1912	614,029	350,737	1937	1,087,740	939,570
1913	334,508	180,220	1938	1,099,664	1,059,853
1914	316,298	168,702	1939	1,906,450	1,629,010
1915	713,790	368,761	1940	1,306,460	1,038,130
1916	870,600	498,921	1941	1,844,580	1,690,590
1917	925,094	590,081	1942	2,336,620	2,305,322
1918	655,189	577,727	1943	2,347,270	2,048,230
1919	580,010	604,075	1944	1,155,580	1,007,299
1920	850,590	956,994	1945	1,070,160	942,072
1921	848,540	931,347	1946	1,511,810	1,692,320
1922	1,105,980	1,179,485	1947	2,604,400	2,163,210
1923	1,210,240	1,280,518	1948	2,483,980	2,701,765
1924	1,230,210	1,293,757			
1925	1,359,700	1,398,502	TOTALS	50,482,973	\$42,815,406
Av Production—1,145,068 tons			Av. Value—\$910,966		

Practically all the crushed stone reported is limestone, though for some years crushed sandstone and granite are included.

DOLomite

Production of dolomite in Oklahoma started June 1, 1948, at a quarry located 3 miles west of Troy in the Arbuckle Mountains. Stone from the quarry is hauled by narrow gauge railway to a crushing plant near Troy. This plant supplies high-magnesian fluxing stone to blast furnaces, chiefly in Texas, and to glass factories in Oklahoma and adjacent states. Although dolomite and dolomitic limestone have been quarried along with limestone for general uses as crushed stone, this is the first operation in Oklahoma to produce high-purity dolomite for industrial uses.

FELDSPAR

The potassium feldspars, orthoclase and microcline, both used in glass-making and ceramics, occur in small pegmatites and as large crystals in granitic rocks of the Wichita and Arbuckle Mountains. There are large reserves of feldspar with an iron oxide content of approximately 0.15-0.25 percent. No production is reported.

Sodium-calcium plagioclase feldspar is abundantly represented in the Wichita Mountains. Large deposits of labradorite-rich anorthosite offer possibilities for production of alumina, together with a by-product suitable for making portland cement.

GALENA

Galena, a lead sulfide mineral, is the chief ore mineral of lead in Oklahoma. Production figures for lead content, and not for the mineral galena, are given under lead.

GALLIUM

Gallium is one of the minor relatively rare metals that has found favor for some specialized uses in recent years. The principal use has been in the construction of special thermometers that measure up to 1200° Centigrade. One of the chief producers has been Eagle-Picher Lead Company, Joplin, Missouri, which obtains this metal from cadmium plant residues and from lithopone sludge. Presumably, much of this source material came originally from the Oklahoma part of the Tri-State Mining District. Total production for the United States in 1948 was estimated at about 200

pounds. Prices quoted ranged from \$1135 to \$2270 per pound, depending on quantity.

GERMANIUM

Germanium is one of the minor metals for which important industrial applications have been developed. Production of Germanium in Oklahoma began in 1939. It is recovered from cadmium fumes obtained during zinc refining. Principal use is in electronic devices.

GLASS SAND

Production figures for glass sand are included with sand and gravel after 1930. Present production of glass sand is several times greater than the years for which figures can be released.

Year	Tons	Value	Year	Tons	Value
1920	31,804	\$ 74,494	1927	30,107	57,787
1921	14,200	28,400	1928	With Miscellaneous	
1922	16,864	27,296	1929	22,872	40,026
1923	32,619	55,055	1930	19,216	30,746
1924	28,871	50,523			
1925	With Miscellaneous		TOTAL	196,553	\$364,327
1926	" "		Average	24,569	\$ 45,541

GRAHAMITE

See Asphaltic Materials.

GRANITE

Year	Tons	Value	Year	Tons	Value
1900		\$ 30,000	1918		116,231
1901		48,530	1919	2,900	64,363
1902		11,970	1920	1,510	70,407
1903		9,030	1921	1,210	53,486
1904		32,080	1922	20,520	121,478
1905		20,720	1923	6,340	96,983
1906		18,847	1924	28,350	159,070
1907		24,550	1925	44,900	194,005
1908		23,239	1926	59,230	164,248
1909		67,584	1927	31,550	143,228
1910		102,566	1928	37,790	156,354
1911		20,244	1929	17,250	174,650
1912		14,460	1930	10,230	121,652
1913		30,678	1931	1,110	74,390
1914		24,695	1932	890	42,805
1915		29,141	1933	11,470	81,579
1916		80,597	1934	49,450	142,223
1917		37,071	1935	48,910	200,698

GRANITE Continued

Year	Tons	Value	Year	Tons	Value
1936	5,290	179,070	1944	3,660	182,543
1937	6,290	201,125	1945	3,660	200,782
1938	10,640	282,455	1946	7,930	394,431
1939	13,500	180,731	1947	16,070	524,289*
1940	3,250	177,085	1948	5,100	600,531
1941	4,000	225,314			
1942	61,390	398,130	TOTALS	517,730	\$6,677,766
1943	3,340	327,428	Av. production—	17,258 tons	
			Av. Value—	\$136,281	

* Includes 11,140 tons crushed and broken granite valued at \$9,944.

GYPSUM

Year	Tons	Value	Year	Tons	Value
1894	1,300	\$ 7,500	1924	316,134	2,600,081
1895	13,100	46,125	1925	320,931	2,599,463
1896	8,000	24,000	1926	324,021	2,301,049
1897	10,734	40,050	1927	271,484	2,073,944
1898	3,150	12,000	1928	397,752	2,021,635
1899	23,526	62,600	1929	369,433	2,255,374
1900	24,937	75,380	1930		
1901	15,930	66,031	1931		
1902	34,156	111,215	1932	65,611	
1903	69,158	234,261	1933	97,008	
1904	53,523	190,245	1934	105,620	
1905		*200,000	1935	125,177	
1906		*356,000	1936	156,545	
1907		*404,000	1937	159,639	266,091
1908	44,632	*288,000	1938	141,341	231,910
1909	122,093	*370,000	1939	161,748	207,503
1910	162,788	*451,000	1940	176,166	227,534
1911	108,653	287,591	1941	258,253	344,489
1912	135,074	268,618	1942	243,545	321,652
1913	147,876	330,416	1943 ¹	371,893	
1914	113,103	312,856	1944 ¹	295,604	
1915	110,790	294,230	1945 ¹	32,343	
1916	161,661	429,350	1946 ¹	138,314	
1917	158,017	562,767	1947 ¹	239,468	
1918	126,208	637,644	1948 ¹	292,605	
1919	114,313	708,660	1949 ¹	355,590	
1920	135,279	816,768	1950 ¹ *	339,746	
1921	209,201	1,289,226			
1922	242,932	1,651,837	TOTALS	8,396,231	\$28,227,990
1923	290,121	2,248,895	Av. Production—	167,925 tons	
			Av. Value—	\$672,095	

* Oklahoma Geological Survey Bulletin 15, Estimated.

¹ Mining World, Vol. 13, No. 5, p. 57, April 15, 1951.

² Estimated.

HEMATITE

See Iron Ores.

IMPSONITE

Included with Grahamite under Asphaltic materials.

INDIUM

Indium has been recovered only in experimental quantities in Oklahoma. It is a by-product in the recovery of cadmium from zinc ores in the Tri-State district.

IRON ORES

Hematite: Paint made from red iron ore of the Wichita Mountains is reputed to make an exceptional rust-inhibitor for metal, as well as possessing excellent wearing and weathering qualities when used on wood. The ore is oolitic hematite impregnating sandstone, and the richer ore contains about 30 percent Fe_2O_3 . A small tonnage annually is shipped to the Atlantic seaboard where it is ground to extremely fine size and used in paint.

Limonite: Brown iron ore occurs in numerous places in the Arbuckle Mountains in masses ranging in size from a few thousand to a few hundred thousand tons each. The ore is brown hydrous oxide of iron, and occurs in lumps that are relatively pure, associated with ochreous clay. Small amounts are being used in making low-heat-of-setting cements. There has been some production of this ore since 1939 but no figures are available.

Magnetite: Magnetite deposits of Oklahoma are in the Wichita Mountains, where they occur with titanium-minerals as small dike-like bodies in pre-Cambrian gabbro. Average composition of the magnetite is 50 percent metallic iron, 17 percent titanium dioxide, 0.3 percent chromium oxide (Cr_2O_3), and 0.3 percent vanadium oxide (V_2O_5). The magnetite deposits at this time are not known to be large.

Siderite: Siderite or iron carbonate occurs in Oklahoma principally as impure nodules and thin beds in dark gray shales of Pennsylvanian age. As there are no large deposits, the chief possibility of their utilization is in making selected paint pigments.

KAOLIN

Essential clay mineral in the Kaolin group—term frequently applied to high-grade Kaolin clays. (See clays).

LEAD					
Year	Tons	Value	Year	Tons	Value
		\$			
1891		500	1927	51,680	6,511,680
1892		500	1928	43,687	5,067,692
1893-1894	1,363	59,982	1929	46,513	5,860,638
1895-1906	Due to lack of transportation, production was small and not reported.		1930	23,052	2,305,200
			1931	13,210	977,540
			1932	10,634	638,040
1907	404	42,824	1933	18,038	1,334,812
1908	1,409	118,356	1934	16,747	1,239,278
1909	2,268	195,048	1935	23,405	1,872,400
1910	1,805	158,840	1936	25,427	2,339,284
1911	1,925	172,250	1937	29,840	3,521,120
1912	2,501	225,090	1938	21,004	1,932,368
1913	3,388	304,920	1939	27,720	2,605,680
1914	7,556	589,368	1940	21,240	2,124,000
1915	7,306	686,764	1941	25,021	2,852,394
1916	12,115	1,671,870	1942	22,806	3,056,004
1917	26,358	4,533,576	1943	19,733	2,959,950
1918	56,097	7,965,774	1944	13,944	2,231,040
1919	53,872	5,710,432	1945	12,664	2,178,208
1920	65,394	10,463,040	1946	13,697	2,985,946
1921	41,552	3,739,680	1947	14,289	4,115,232
1922	62,856	6,914,160	1948	16,918	6,056,644
1923	66,904	9,366,560	1949	19,858	6,275,128
1924	71,358	11,417,280			
1925	79,946	13,910,604	TOTALS	1,167,208	\$160,440,336
1926	69,704	11,152,640	Av. Production—25,938 tons		
			Av. Value—\$3,413,624		

LIME					
Year	Tons	Value	Year	Tons	Value
		\$			
1902		25	1913	2,640	12,160
1903		4,800	1914	2,293	11,130
1904	330	3,194	1915	3,033	23,414
1905	500	4,650	1916	4,351	35,900
1906	630	4,850	1917-1925	Included with Miscellaneous	
1907		5,000			
1908		5,500	1926	257	2,185
1909		6,000	1927-1930	Included with Miscellaneous	
1910	2,140	9,700			
1911	3,472	14,603	1931-1940	Not listed*	
1912	2,651	13,538			
			TOTALS	22,297	\$156,649

* No production figures available 1927-1949; value included under Miscellaneous.

LIMESTONE*

Year	Tons	Value	Year	Tons	Value
		\$			
1898		3,000	1925	1,372,040	1,414,241
1899		50,550	1926	1,496,350	1,321,188
1900		25,586	1927	1,688,500	1,371,310
1901		32,497	1928	1,928,590	1,570,824
1902		50,541	1929	2,074,990	1,552,178
1903		56,140	1930	1,942,750	1,505,716
1904		101,516	1931	1,534,410	1,203,166
1905		168,924	1932	765,240	536,666
1906		171,983	1933	700,790	486,427
1907		189,568	1934	850,040	562,974
1908		257,066	1935	647,450	419,878
1909		450,055	1936	1,151,370	922,102
1910		509,344	1937	999,040	897,400
1911		594,664	1938	1,010,060	1,002,776
1912		409,994	1939	1,814,540	1,580,621
1913		246,912	1940	1,203,620	979,286
1914		237,044	1941	1,783,200	1,641,390
1915		398,636	1942	2,288,440	2,251,029
1916		516,230	1945	1,070,160	942,072
1917		575,165	1944	1,155,580	1,007,299
1918		574,795	1945	1,070,160	942,072
1919	659,450	656,843	1946	1,511,810	1,692,320
1920	870,160	977,949	1947	1,558,610	1,822,494
1921	877,140	970,028	1948	2,483,980	2,701,765
1922	1,130,360	1,197,082			
1923	1,254,740	1,326,266	TOTALS	41,802,610	\$43,515,377
1924	1,271,930	1,334,647	Av. Production—1,393,420 tons.		
			Av. Value—\$853,262		

* Most Oklahoma limestone is crushed. Tons and value of crushed limestone is also included under crushed stone.

AGRICULTURAL LIMESTONE

Year	Tons	Value	Year	Tons	Value
		\$			
1933	1,010	618	1942	23,000	42,045
1934	(a)	(a)	1943	30,380	35,004
1935	(a)	(a)	1944	(a)	(a)
1936	13,790	18,949	1945	54,560	90,019
1937	3,090	3,089	1946	335,460	533,244
1938	30,520	59,999	1947	249,190	395,751
1939	3,200	4,002	1948	182,010	260,166
1940	9,660	9,758			
1941	9,860	16,263	TOTALS	945,730	\$1,463,907
(a) Included with Miscellaneous.					

LIMONITE

(See Iron Ores.)

MAGNETITE

(See Iron Ores.)

MALTHA

(See asphaltic materials.)

LIQUEFIED PETROLEUM GASES

No figures available by states prior to 1941. Total U. S. production for 1935 was reported as 76,855,000 gallons, and had increased to 313,456,000 gallons in 1940. As a result of the growing importance of liquefied petroleum gases, the Bureau of Mines began reporting production and value by States in 1941. A measure of the rate of growth of this industry is indicated by the fact that Oklahoma production in 1941 exceeded the United States total of 1935. The gases included in the totals are butane, propane, butane-propane mixtures, and pentane.

Year	Gallons	Value
1941	91,136,000	\$ 2,076,000
1942	108,408,000	2,853,000
1943	112,371,000	2,858,000
1944	120,522,000	3,400,000
1945	131,850,000	3,276,000
1946	131,076,000	2,955,000
1947	165,602,000	5,700,000
1948	196,581,000	10,963,000
1949	238,939,000	7,909,000
TOTALS	1,296,485,000	\$41,990,000
Av. Production—149,056,000 gallons		
Av. Value—\$3,655,555		

• Preliminary figures.

MANGANESE

206 long tons of manganese, valued at \$1174, were produced from the Arbuckle Mountain area in 1891. During 1916 one car load, probably 10-20 tons, was produced from the Ouachita Mountain area. A little ore was reported for the State in 1923. There has been some production since 1941 in the Ouachita Mountain area. Available figures are as follows:

1941	40 short tons
1942	31 short tons
1943	265 short tons

MARBLE

Marble valued at \$16,805 was produced during 1907.

MINERAL WATERS

Year	Gallons	Value	Year	Gallons	Value
1905		\$ 5,000	1916	1,353,513	40,189
1906		7,744	1917	852,381	26,997
1907	69,725	7,345	1918	1,166,485	20,249
1908	534,114	52,779	1919	1,368,375	41,825
1909	563,475	35,194	1920	1,437,810	49,287
1910	115,000	4,950	1921	1,319,895	45,078
1911	497,074	14,290	1922	1,434,885	46,047
1912	1,015,512	32,971	1923	996,564	34,562
1913	502,439	26,231			
1914	804,675	26,906	TOTAL	14,922,314	\$541,649
1915	890,392	24,005	Average	877,783	\$ 28,508
No figures after 1923.					

NATURAL GAS

Year	M. Cu. Ft.	Value	Year	M. Cu. Ft.	Value
1902		\$ 360	1916	123,517,385	11,983,774
1903		1,000	1917	137,617,101	13,984,656
1904		49,665	1918	124,317,179	15,805,135
1905		130,137	1919	163,649,000	23,650,000
1906	3,520,396	259,862	1920	154,467,200	25,805,000
1907	4,867,031	417,221	1921	124,058,000	23,429,000
1908	11,924,574	860,159	1922	140,631,000	33,475,800
1909	28,036,976	1,806,193	1923	203,082,000	31,214,000
1910	50,429,646	3,490,704	1924	214,452,000	31,045,700
1911	67,275,608	6,731,770	1925	249,285,000	36,121,000
1912	73,799,319	7,406,528	1926	286,421,000	42,140,000
1913	75,017,668	7,436,389	1927	326,864,000	41,391,000
1914	78,167,414	8,050,039	1928	320,861,000	47,476,000
1915	87,516,753	9,195,804	1929	357,893,000	53,528,000

NATURAL GAS Continued

Year	M. Cu. Ft.	Value	Year	M. Cu. Ft.	Value
1930	348,116,000	47,632,000	1941	234,054,000	29,821,000
1931	263,685,000	32,593,000	1942	269,704,000	38,270,000
1932	265,487,000	28,108,000	1943	285,045,000	42,503,000
1933	245,759,000	23,760,000	1944	310,888,000	46,346,000
1934	254,457,000	23,744,000	1945	357,530,000	66,014,000
1935	274,313,000	26,541,000	1946	380,938,000	76,000,000
1936	280,481,000	28,847,000	1947	419,010,000	16,509,000*
1937	296,260,000	32,039,000	1948	480,573,000	23,356,000*
1938	263,164,000	27,391,000	1949	432,516,000	21,626,000*
1939	250,875,000	28,103,000			
1940	257,626,000	31,603,000	Totals	9,568,151,250	\$1,167,690,896

Av. production—217,457,983 M. cu. ft.

Av. value (1902-1949)—\$24,326,893.

* 1947 value estimated at wells; value for previous years is at point of consumption.

† Preliminary figures.

NATURAL GASOLINE

Year	Gallons	Value	Year	Gallons	Value
1911	388,058	\$ 20,975	1931	454,886,000	12,619,000
1912	1,575,644	99,626	1932	378,584,000	8,803,000
1913	6,462,968	577,942	1933	360,488,000	12,177,000
1914	17,277,555	1,113,059	1934	355,438,000	10,728,000
1915	31,665,991	2,361,029	1935	379,913,000	14,593,000
1916	48,359,602	5,865,145	1936	418,591,000	17,516,000
1917	115,123,424	21,541,905	1937	492,290,000	20,272,000
1918	163,700,550	28,389,045	1938	468,499,000	14,373,000
1919	189,995,038	32,564,532	1939	436,123,000	15,502,000
1920	178,856,929	31,334,493	1940	399,369,000	8,926,000
1921	185,340,742	22,066,014	1941	362,247,000	16,084,000
1922	189,403,670	24,914,048	1942	336,707,000	12,655,000
1923	270,249,000	23,012,000	1943	309,942,000	15,663,000
1924	301,062,000	23,338,000	1944	301,246,000	16,200,000
1925	390,861,000	40,973,000	1945	284,334,000	15,223,000
1926	475,716,000	41,433,000	1946	283,915,000	12,907,000
1927	548,109,000	29,114,000	1947	280,891,000	18,690,000
1928	619,691,000	40,959,000	1948	272,897,000	26,143,000
1929	676,030,000	42,766,000	1949	291,000,000	18,372,000
1930	591,194,000	29,148,000			
			TOTALS	11,868,422,171	\$730,036,813

Av. Production—304,318,517 gallons.

Av. Value—\$18,718,893.

† Preliminary figures.

OCHRE

Some production reported "with other states" in 1904.

PETROLEUM

Year	Barrels	Value	Year	Barrels	Value
1891	30	\$ 150	1921	114,634,000	183,185,000
1892	80	480	1922	149,571,000	258,160,000
1893	10	60	1923	160,929,000	279,700,000
1894	130		1924	173,538,000	272,450,000
1895	37		1925	176,768,000	348,230,000
1896	170		1926	179,195,000	413,900,000
1897	625		1927	277,775,000	397,200,000
1898	1,020		1928	249,857,000	347,600,000
1899	2,230		1929	255,004,000	364,650,000
1900	6,472		1930	216,486,000	279,250,000
1901	10,000	7,125	1931	180,574,000	119,200,000
1902	37,100	32,940	1932	153,244,000	137,920,000
1903	138,911	142,402	1933	182,251,000	120,800,000
1904	1,366,748	1,325,745	1934	180,107,000	183,700,000
1905	* 8,264,000	*4,296,000	1935	185,288,000	189,000,000
1906	*18,091,000	*8,247,000	1936	206,555,000	232,100,000
1907	43,524,128	17,513,542	1937	228,839,000	283,500,000
1908	45,798,765	17,694,843	1938	174,994,000	209,500,000
1909	47,859,218	17,428,990	1939	159,913,000	166,300,000
1910	52,028,718	19,922,660	1940	156,164,000	162,500,000
1911	56,069,637	26,451,767	1941	154,702,000	174,800,000
1912	51,427,071	34,672,604	1942	140,690,000	168,000,000
1913	63,579,384	59,581,948	1943	123,152,000	146,550,000
1914	73,631,724	57,253,187	1944	124,616,000	153,290,000
1915	97,915,243	56,706,133	1945	139,299,000	177,050,000
1916	107,071,715	128,463,805	1946	134,794,000	194,100,000
1917	107,507,471	181,646,981	1947	141,019,000	270,760,000
1918	103,347,070	231,136,205	1948	154,455,000	398,490,000
1919	86,911,000	184,100,000	1949	151,902,000	388,870,000
1920	106,206,000	356,439,000			
			TOTALS	6,097,110,707	\$8,423,818,567

Av. production—103,340,860 barrels.

Av. value—\$161,996,511.

* Estimates by Arnold and Kemnitzer.

† Preliminary figures.

PUMICITE

(See volcanic ash.)

PYRITE

The only production credited to Oklahoma of which a record was found was in 1911 when 124 tons valued at \$448.00 was reported.

RADIOACTIVE MINERALS

Public interest was created in radioactive minerals with the development of atom bombs and the possibilities for peacetime use of atomic energy. No commercial deposits of uranium-bearing minerals have been found in Oklahoma.

Best samples so far examined have contained traces of the radioactive elements of uranium and thorium.

These were in association with zircon crystals in a pegmatite dike in the Wichita Mountains. A few nodular asphaltite like bitumen samples from western Oklahoma gave an abnormally high radioactive count. Both these materials, however, are far too low in the radioactive elements to be of more than scientific interest. No samples had come to the Survey, at the time this was written, that showed promise of commercial deposits of uranium minerals.

SALT					
Year	Barrels	Value	Year	Tons	Value
1900	6,861	\$ 6,136	1923	5,500	49,850
1901	7,506	5,986	1941	10,743	42,737
1902	7,102	7,562	1942	8,305	35,132
1903		*2,070	1943	7,716	30,496
1904		*1,961			
1905		*2,145	Production 1900-1913 given in		
1906	9,893	4,965	barrels; 1928-1943 in tons.		
1907	800	910			
1908		* 900	Standard for barrel was 280 lbs. or		
1909		* 900	approximately 7.14 barrels per		
1910	2,564	881	ton.		
1911	500	431			
1912		325	* Estimated.		
1913		259			

SAND AND GRAVEL					
Year	Tons	Value	Year	Tons	Value
1907	108,560	\$ 22,506	1916	574,844	196,206
1908	119,940	35,971	1917	463,233	244,432
1909	681,785	185,812	1918	383,747	215,862
1910	650,236	186,977	1919	467,482	304,029
1911	291,424	97,539	1920	875,677	626,099
1912	492,858	163,298	1921	881,849	686,507
1913	157,628	39,457	1922	1,357,272	903,043
1914	1,477,618	713,117	1923	1,404,185	973,461
1915	With Miscellaneous		1924	1,846,268	894,455

SAND AND GRAVEL Continued

Year	Tons	Value	Year	Tons	Value
1925	1,626,758	958,657	1940	1,030,435	284,010
1926	1,556,175	978,590	1941	1,513,988	627,864
1927	2,074,963	1,331,222	1942	3,109,630	1,946,644
1928	2,827,810	1,426,258	1943	2,141,705	1,191,929
1929	2,904,897	1,612,755	1944	1,364,604	746,207
1930	2,553,070	1,446,137	1945	1,274,186	761,448
1931	937,746	529,851	1946	1,577,138	947,283
1932	616,250	306,415	1947	1,670,205	1,125,322
1933	1,220,425	361,425	1948	2,004,512	1,088,003
1934	703,789	343,704	1949	2,921,157	1,525,415
1935	1,178,262	335,373			
1936	1,338,362	514,370	TOTALS	52,958,046	\$28,047,112
1937	934,499	414,495	Av. Production—1,260,905 tons.		
1938	823,814	354,486	Av. Value—\$667,788.		
1939	859,060	400,478	Figures include glass sand.		

SANDSTONE

Year	Tons	Value	Year	Tons	Value
1902		\$ 24,200	1923	4,820	4,671
1903		6,500	1924	2,750	5,580
1904		2,995	1925	2,020	5,190
1905		15,112	1926-1928	With miscellaneous	
1906		40,846	1929	3,840	2,110
1907		43,403	1930	With miscellaneous	
1908		57,124	1931	196,160	133,226
1909		59,855	1932	7,650	7,650
1910		19,801	1933	None reported	
1911		90,971	1934	530	78
1912		5,334	1935-36	With miscellaneous	
1913		1,010	1937	31,030	34,518
1914		1,934	1938	10,290	14,774
1915		2,525	1939	82,020	40,954
1916		24,229	1940	79,760	47,579
1917		5,096	1941	61,380	49,200
1918	With miscellaneous		1942-49	With crushed stone	
1919	None reported				
1920	With miscellaneous		TOTALS	488,320	\$753,165
1921	With miscellaneous		Av. Production—37,563 tons		
1922	6,070	8,810	Av. Value—\$25,971.		

Much sandstone is crushed. Tons and value of crushed sandstone also included under crushed stone.

SILVER		
Year	Ounces	Value
1913	1,300	\$ 785
1914	6,187	3,421
1915	None reported	
1916	606	399
Totals	8,093	\$4,605

SPHALERITE

A zinc sulfide mineral and chief source of metallic zinc in northeast Oklahoma. Production figures under zinc are for the recoverable metallic zinc.

SULFURIC ACID

Sulfuric acid has been made in Oklahoma since 1928, from Gulf Coast sulfur, and as a by-product of zinc smelting. No statistics available on quantity or value.

TRIPOLI

First production of tripoli in Oklahoma probably began with the erection of a mill by the American Tripoli Company one mile north of Seneca, Missouri, in 1887. The Company located quarries in both Oklahoma and Missouri. A larger mill was constructed in 1907 at Seneca, and production has been more or less continuous since that time.

The only production figures available are as follows:

Year	Tons	Value
1926	6,799	\$111,054
1927	7,872	124,069

VANADIUM

About the time of World War I, a small quantity of Vanadium-bearing ash reportedly was shipped from Page, Le Flore County. The ash was obtained by burning impsonite from a deposit on the south side of the mountain, and about 1½ miles east of Page. According to an analysis reported by Clark in Bulletin 770 (p. 773) of the U. S. Geological Survey, the ash from the impsonite contains 12.2 percent of Vanadium Oxide. The impsonite is reported to contain only about one percent ash.

According to information obtained by a representative of the Kansas City Southern Railway, about 20 sacks of the ash, weighing 100 pounds each, were shipped from the Page station.

VOLCANIC ASH

Year	Tons	Value
1930	1,000	\$ 8,000
1931	812	6,500
Total	1,812	\$14,500

Production, if any, included with miscellaneous from 1932-1949.

ZINC

Year	Tons	Value	Year	Tons	Value
1894		3,272	1927	206,611	26,446,208
1895-1904	Not available		1928	180,252	21,990,744
1905	2,670	103,480	1929	192,042	25,349,544
1906	3,242	124,528	1930	136,153	13,070,688
1907	719	84,842	1931	78,132	5,938,032
1908	2,235	210,090	1932	63,437	3,806,220
1909	3,008	324,864	1933	91,065	7,649,460
1910	2,297	248,076	1934	107,772	9,268,392
1911	5,150	587,100	1935	129,763	11,419,144
1912	5,769	769,122	1936	129,175	12,917,500
1913	11,664	1,306,368	1937	135,696	17,640,480
1914	13,992	1,427,184	1938	112,924	10,840,704
1915	14,314	3,549,872	1939	140,379	14,599,416
1916	28,754	7,706,272	1940	162,935	20,529,810
1917	85,835	17,510,340	1941	166,602	24,990,300
1918	161,401	29,374,982	1942	146,510	27,250,860
1919	178,410	26,047,860	1943	114,085	24,642,360
1920	219,727	35,595,774	1944	91,449	20,850,372
1921	121,372	12,137,200	1945	69,300	15,939,000
1922	209,682	23,903,748	1946	69,552	16,970,688
1923	242,421	32,969,256	1947	51,062	12,357,004
1924	269,137	34,987,810	1948	43,821	11,656,386
1925	283,371	43,072,392	1949	44,033	10,920,184
1926	272,567	40,885,050			

TOTALS	4,800,487	\$679,972,978
Av. Production—106,678 tons	Av. Value—\$14,782,021	

ZIRCON

Zircon crystals occur near Mountain Park in the Wichita Mountains, but no reports of commercial production of this mineral

have been found. However, an old 1911 list of producers furnished by the U. S. Geological Survey lists one operator in the Wichita Mountains; probably Mr. H. G. Southard who dug a shaft in Sec. 21, T. 3 N., R. 15 W. at his Zircon No. 1 mine.

MISCELLANEOUS			
Year	Value	Year	Value
1905	\$202,023	1929	5,929,317
1906	380,955	1930	7,363,290
1907	426,274	1931	4,407,955
1908	713,871	1932	2,492,555
1909	1,120,732	1933	3,493,169
1910	1,439,954	1934	4,881,601
1911	801,324	1935	4,502,982
1912	1,123,094	1936	5,943,983
1913	1,264,462	1937	4,338,213
1914	1,029,702	1938	3,636,013
1915	1,874,144	1939	3,945,534
1916	1,380,722	1940	3,710,833
1917	1,721,273	1941	4,695,858
1918	537,211	1942	6,770,356
1919	656,989	1943	5,857,180
1920	571,929	1944	3,606,355
1921	161,375	1945	3,716,517
1922	4,283,343	1946	6,359,531
1923	5,160,576	1947	7,149,014
1924	4,139,833	1948	8,105,625
1925	4,675,411	1949	8,706,045
1926	4,380,115		
1927	5,555,402	TOTAL	\$159,726,880
1928	6,454,240	Av. Value—	\$3,549,486

VALUE OF OKLAHOMA MINERAL PRODUCTION BY GROUPS—1885-1949

Year	Oil and Gas		Lead and Zinc		Coke and Coal		Other		TOTAL
	Value	%	Value	%	Value	%	Value	%	
1885					762,902	100			762,902
1886					877,557	100			877,557
1887					1,320,127	100			1,320,127
1888					1,453,827	100			1,453,827
1889					1,341,764	100			1,341,764
1890					1,600,765	100			1,600,765
1891	\$	150	\$	500*	1,927,520	99.9	1,174		1,929,344
1892		480		500*	2,055,881	99.9			2,056,861
1893		60		31,627*	2,260,272	98.6			2,291,959
1894				31,627*	1,551,986	97.5			1,591,113
1895					1,754,911	97.4			1,801,036
1896					1,991,689	97.7			2,038,689
1897					1,892,083	95.7		7,500	1,976,485
1898					1,924,277	93.7		46,125	2,053,168
1899					2,271,750	88.4		47,000	2,570,527
1900								84,402	
1901		7,125			2,940,428	90.0		331,559	3,271,987
1902		33,300	.2		4,070,102	89.4		475,778	4,553,005
1903			.7		4,468,027	87.4		609,457	5,110,784
1904		143,402			6,614,005	86.7		869,058	7,626,465
1905		1,375,410	1.9		5,741,231	71.0		965,452	8,082,093
1906		4,426,137	41.4		5,344,782	50.0		808,230	10,682,679
1907				1.0					
1908		8,506,862	55.0		103,480	36.8		1,141,725	15,459,686
1909		17,930,763	66.6	.8	124,528	27.9		1,334,178	26,908,968
1910		18,555,002	69.8	.5	127,666	22.5		1,713,362	26,586,751
1911				1.2	328,446				

MINERAL PRODUCTION OF OKLAHOMA 1885-1949

Year	Oil and Gas		Lead and Zinc		Coke and Coal		Other		TOTAL
	Value	%	Value	%	Value	%	Value	%	
1909	19,235,183	66.3	519,912	1.3	6,253,367	21.6	2,999,676	10.3	29,008,138
1910	23,413,364	71.0	406,916	1.2	5,867,947	17.8	3,300,638	10.0	32,988,865
1911	33,204,512	77.3	759,350	1.8	6,291,494	14.7	2,423,090	5.7	42,678,446
1912	49,173,758	78.7	994,212	1.8	7,867,331	14.7	2,573,829	4.8	53,614,130
1913	65,596,279	84.3	1,611,288	2.0	8,542,748	10.7	2,418,505	3.0	80,168,820
1914	66,416,285	84.3	2,016,552	2.6	8,204,015	10.4	2,107,595	2.7	78,744,447
1915	68,262,966	84.0	4,236,636	5.2	7,435,906	9.1	1,376,454	1.7	81,311,982
1916	146,312,724	86.3	9,378,142	5.5	7,525,427	4.4	6,340,038	3.7	169,556,331
1917	217,173,542	83.8	22,043,916	8.5	12,335,413	4.8	7,581,506	2.9	259,134,377
1918	275,330,385	81.7	37,340,756	11.1	17,508,884	5.2	6,877,896	2.0	336,857,921
1919	240,314,532	82.6	31,758,292	10.9	14,544,901	5.0	4,460,449	1.5	291,078,174
1920	413,578,493	83.8	46,058,814	9.3	23,294,000	4.7	10,389,052	2.1	493,320,359
1921	228,680,014	84.7	15,876,880	5.9	15,546,000	5.8	9,779,892	3.6	269,882,786
1922	316,549,348	85.8	30,817,908	8.3	11,527,000	3.1	10,174,856	2.8	369,069,612
1923	333,926,000	83.7	42,335,816	10.6	10,874,000	2.7	11,674,814	2.9	398,810,630
1924	326,833,700	83.2	46,405,090	11.8	8,590,000	2.2	11,201,875	2.8	393,030,565
1925	425,324,000	84.8	56,982,996	11.4	7,667,000	1.5	11,793,122	2.3	501,767,118
1926	497,473,000	87.3	52,037,690	9.1	9,042,000	1.6	10,966,003	1.9	569,518,693
1927	467,705,000	89.1	32,957,888	6.3	11,570,000	2.2	12,361,844	2.4	524,594,732
1928	436,035,000	89.6	27,058,436	5.6	10,365,000	2.1	13,175,911	2.7	486,634,347
1929	460,944,000	89.2	31,210,182	6.0	11,481,000	2.2	13,050,050	2.5	516,686,232
1930	356,030,000	91.3	15,375,888	3.9	7,768,000	2.0	10,997,103	2.8	390,170,991
1931	164,412,000	90.4	6,915,572	3.8	4,614,000	2.5	6,963,286	3.3	181,904,857
1932	174,331,000	94.4	4,444,260	2.4	2,646,000	1.5	3,199,649	1.7	185,120,909

VALUE BY GROUPS

Year	Oil and Gas		Lead and Zinc		Coke and Coal		Other		TOTAL
	Value	%	Value	%	Value	%	Value	%	
1933	156,737,000	90.8	8,984,272	5.2	2,616,000	1.5	4,223,652	2.5	172,560,924
1934	218,172,000	92.0	10,507,670	4.4	2,846,000	1.2	5,682,913	2.4	237,208,583
1935	230,134,000	91.4	13,291,544	5.3	2,879,000	1.1	5,396,354	2.2	251,700,898
1936	278,463,000	91.2	15,256,784	5.0	3,500,000	1.2	7,371,865	2.6	305,191,649
1937	335,611,000	91.4	21,161,600	5.8	3,841,000	1.0	6,630,622	1.8	367,444,222
1938	251,264,000	92.1	12,773,072	4.7	2,947,000	1.1	5,876,006	2.1	272,860,078
1939	209,905,000	88.9	17,205,096	7.3	2,486,000	1.0	6,580,518	2.8	236,176,614
1940	203,029,000	86.2	22,653,810	9.6	4,021,760	1.7	5,830,492	2.5	235,535,062
1941	222,781,000	84.5	27,842,694	10.6	4,700,104	1.7	8,440,125	3.2	263,763,923
1942	221,778,000	81.7	30,306,364	11.2	6,777,351	2.5	12,436,284	4.6	271,298,469
1943	207,574,000	81.6	27,602,310	10.8	8,954,354	3.5	10,331,336	4.1	254,462,000
1944	219,236,000	84.1	23,081,312	8.3	11,135,485	4.3	7,379,203	2.8	260,832,000
1945	261,563,000	88.2	18,117,203	6.2	10,487,344	3.5	6,396,448	2.1	296,564,000
1946	285,962,000	87.7	19,956,634	6.0	9,926,836	3.1	10,302,580	3.2	326,148,000
1947	311,659,000	87.6	16,472,236	4.6	15,101,477	4.3	12,517,287	3.5	355,750,000
1948	458,852,000	90.5	17,713,030	3.5	16,618,676	3.3	13,662,294	2.7	506,846,000
1949	436,777,000	90.3	17,195,312	3.6	15,242,403	3.2	14,481,255	2.9	483,696,000

* Includes—Oil, Natural Gas, Natural Gasoline, and Liquefied Petroleum Gases.
 * Estimated.

VALUE OF OKLAHOMA MINERAL, AGRICULTURAL, AND MANUFACTURED PRODUCTS—1919-1949

Year	Minerals	Agriculture	MANUFACTURING			Total Income
			Cost of Materials	Value Added	Value of Products	
1919	\$291,078,174		\$312,605,329	\$ 88,757,040	\$401,362,869	NOTE: Total income includes all income payments including interest and dividend payments and serv-ices.
1920	493,320,359		203,204,006	79,856,785	283,060,791	
1921	269,882,786					
1922	369,069,612					
1923	398,310,630					
1924	393,030,665		229,684,969	84,774,471	314,459,440	
1925	501,767,118	\$335,082,000	298,522,237	101,769,588	400,291,325	
1926	569,518,693	300,964,000				
1927	524,594,732	288,695,000				
1928	486,634,347	272,182,000				
1929	516,635,232	297,981,000				
1930	390,170,991	255,143,000				
1931	181,904,857	146,743,000				
1932	185,120,909	120,064,000				
1933	172,560,924	96,183,000				
1934	237,208,533	127,425,000				
1935	251,700,398	113,539,000				
1936	305,191,649	144,475,000				
1937	367,444,222	148,431,000				
1938	272,860,073	184,833,000				
1939	236,176,614	159,129,000				
1940	235,635,062	*175,048,000				
1941	263,763,923	255,197,000				
1942	271,298,469	356,703,000				
1943	254,642,000	389,497,000				
1944	260,832,000	437,431,000				
1945	296,554,000	468,497,000				
1946	326,148,000	486,170,000				
1947	355,750,000	649,495,000				
1948	506,846,000					
1949	483,696,000			340,500,000	486,820,000	

* Estimated. Except for minerals, data for this table compiled by Bureau of Business Research, University of Oklahoma, Francis R. Cella, Director.

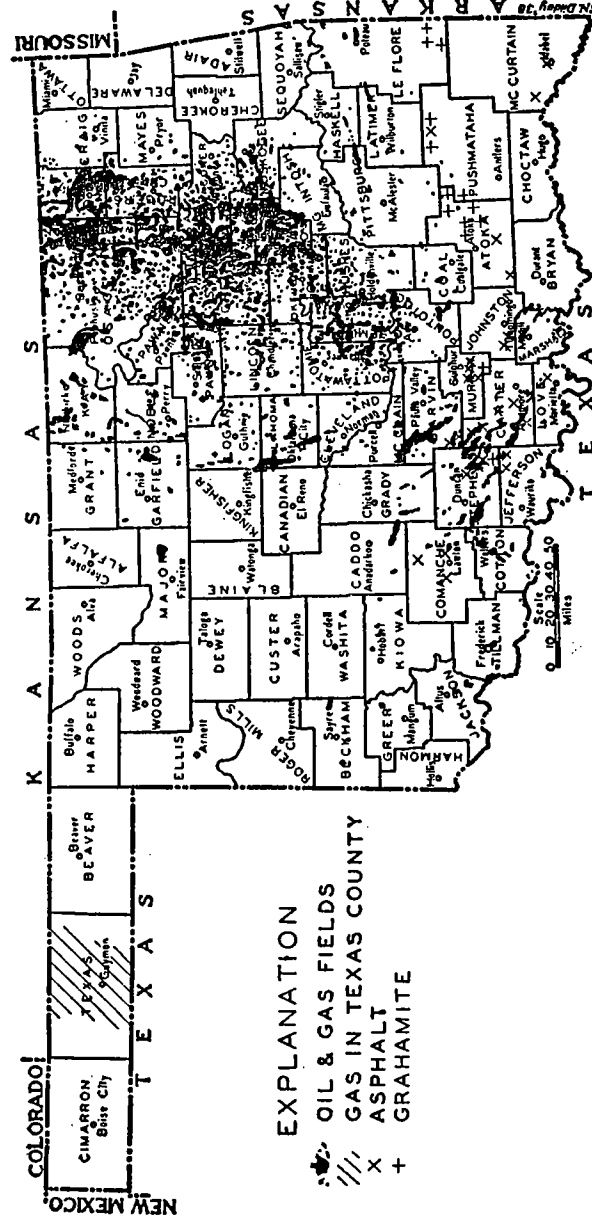


Figure 1

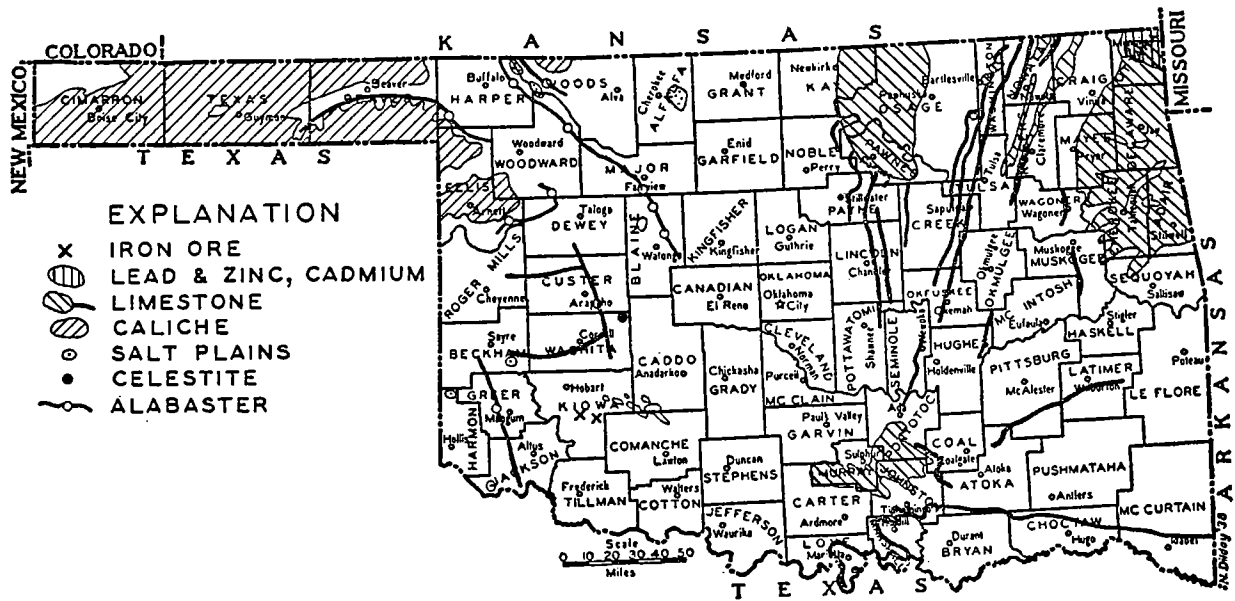


FIGURE 4

MINERAL PRODUCTION AND VALUE FOR SELECTED YEARS																	
Product	Unit	1885		1890		1900		1910		1920		1930		1940		1945	
		Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Asphalt	Short tons							11,959	65,244	152,087	1,758,501	a	a	a	a	a	a
Cement	Barrels							a	a	1,484,698	3,284,412			a	a	a	a
Chats	Short tons											330,000	82,500	2,152,877	308,726		
Clay products																	
Clay—raw	Short tons						194,457		920,921		2,769,013		941,365		532,000		707,272
Coal	Short tons	500,000	750,000	869,229	1,569,188	1,922,298	2,788,224	2,646,226	5,867,947	4,849,288	23,294,000	2,793,954	7,768,000	1,645,981	4,021,760	243,358	178,658
																2,908,976	10,487,344
Coke	Short tons	3,584	12,902	6,639	21,577	38,141	152,204										
Gypsum	Short tons					24,937	75,380	162,788	459,137	135,279	816,768	a	a	176,166	227,534	a	a
Iron Ore	Short tons													a	a		
Lead	Short tons							1,805	158,840	65,394	10,463,040	23,052	2,305,000	21,240	2,124,000	12,644	2,178,208
Lime	Short tons							2,140	9,700	a	a	a	a	a	a	a	a
Liquified Petroleum Gases	Gallons													a	a	131,850,000	3,276,000
Mineral waters	Gallons sold							115,000	4,950	1,487,810	49,287	n	n	n	n	n	n
Natural Gas	M. Cu. Ft.								3,490,704	154,467,200	25,805,000	348,116,000	47,632,000	257,626,000	31,603,000	357,530,000	12,764,000
Natural gasoline	Gallons									178,856,929	31,334,493	591,194,000	29,148,000	399,369,000	8,926,000	284,334,000	15,223,000
Petroleum	Barrels					6,472		52,023,718	19,922,660	106,206,000	356,439,000	216,486,000	279,250,000	156,164,000	162,500,000	139,299,000	177,050,000
Pyrite	Long tons (1911)							a	a								
Salt	Barrels					6,861	6,136	2,564	881			a	a	a	a	a	a
Sand & Gravel	Short tons							650,236	186,977	875,677	626,099	2,553,070	1,446,137	1,030,535	284,010	1,274,186	761,448
Stone	Short tons							55,586	502,537	875,560	1,056,136	1,958,120	1,631,477	1,311,640	1,217,525	3,894,720	1,572,772
Sulfuric acid																	
Tripoli										a	a	a	a	a	a	a	a
Volcanic ash	Short tons											a	a	a	a		
Zinc								2,297	248,076	219,727	35,595,774	136,153	13,070,688	162,935	20,529,810	69,300	15,939,000
Miscellaneous									1,032,417		571,929		7,363,290		3,710,833		3,616,517
TOTALS			762,902		1,600,765		3,271,987		32,988,865		493,320,359		390,170,991		235,535,062		243,854,219
Oklahoma area	69,919 sq. miles																
Per cent of U. S. area	2.3																
Oklahoma population				258,657		790,391		1,657,155		2,038,283		2,396,040		2,336,434			
Per cent of U. S. population				0.4		1.0		1.8		1.9		2.0		1.8			
Oklahoma, per cent of U. S. min- eral production		0.01		0.03		0.03		1.6		7.1		8.2		4.2		2.1	
a. Included with miscellaneous.																	

a. Included with miscellaneous.
n. No canvass.